Greening your home SuperHome truths about energy efficiency

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It is unequivocal that human influence has warmed the climate

Met Office















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To reduce residential emissions, we must use less fossil-fuel energy or use renewable energy instead

electricity from renewables

My house in Reading is Pioneer SuperHome 134 (of about 250)



Attached neighbours' house

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Pioneer SuperHomes are houses which have been retrofitted by their present owners to reduce CO2 emissions by at least 60%.

The aim is to share information and experience with others who might want to do something similar.





Reduce space and water heating



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Reduce space and water heating Use a heat pump instead of a boiler Use efficient electrical appliances (especially wet and cold appliances) Buy renewable electricity or make your own Don't be distracted by the myth that

"Every little helps." If everyone does a little, we'll achieve only a little. We must do a lot. What's required are big changes in demand and in supply. (David Mackay)

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or

mineral wool layer about 400 mm thick



PIR (polyisocyanurate) layer about 200 mm thick



90% of the dwellings in Great Britain have lofts, of which 8.3M (30%) have **no loft insulation** ($U \approx 2.5$).

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Cavity wall



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About 70% of the houses in GB have cavity walls, 6.1M (30%) with no cavity insulation. 8.5M houses have solid walls, 90% with no wall insulation.

Exterior insulation of gable-end wall by creating a cavity



190 mm PIR50% better thanregulations for anew dwelling.20 times betterthan two bricks.



Thermal view of the side of my house and detached neighbours'



Interior insulation of other external walls and double glazing



New plasterboard wall in front of insulation 100 mm PIR

Interior insulation of other external walls and double glazing



New double-glazed uPVC sash window 3 times better than single glazing

New plasterboard wall in front of insulation 100 mm PIR

Insulating under suspended ground floor



New floorboard

150 mm PIR between joists + 75 mm PIR under joists 7 times better than floorboards

Floor joist

Old floorboard

Air source heat pump (ASHP) in my back garden

The heat pump replaced the boiler, with no other change to the central heating (radiators etc.)



A heat pump consumes less energy to produce a given amount of heat



Free **renewable energy** from the sun



Solar thermal panel (hot water)

Solar photovoltaic panel (electricity)

Domestic electricity supply



Domestic electricity supply



Domestic electricity supply



CO₂ savings, costs and pay-back times



Loft insulation 1.1 tonne/year CO₂ £0.5k 2.1 tonne/year/k£ 1 year



Cavity wall insulation 0.4 tonne/year CO₂ £1k 0.97 tonne/year/k£ 3 years



Solar PV panels 0.8 tonne/year CO₂ CO₂ saved for house £8k Cost for house 0.099 tonne/year/k£ Cost of CO₂ saving 8 years if used Pay-back time 16 years if sold

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Loft insulation 1.1 tonne/year CO₂ £0.5k 2.1 tonne/year/k£ 1 year



Exterior wall internal insulation 1.1 tonne/year CO₂ £12k 0.091 tonne/year/k£ 25 years



Cavity wall insulation 0.4 tonne/year CO₂ £1k 0.97 tonne/year/k£ 3 years



Exterior wall external insulation 1.3 tonne/year CO₂ £20k 0.064 tonne/year/k£ 33 years



Solar PV panels 0.8 tonne/year CO₂ £8k 0.099 tonne/year/k£ 8 years if used 16 years if sold



Suspended floor insulation 0.3 tonne/year CO₂ £6k 0.042 tonne/year/k£ 55 years



Double glazing 0.4 tonne/year CO₂ £14k 0.030 tonne/year/k£ 80 years



Air source heat pump 1.0 tonne/year CO₂ £7k 0.14 tonne/year/k£ never



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- Loft insulation
- Wall insulation (in the cavity if any, otherwise inside or outside)
- Solar electricity generation and solar water heating
- Double or triple glazing
- Air source, ground source or water source heat pump (which consume 2–3 times less energy)
- Importing the remaining energy requirement from suppliers of renewable electricity.

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Final point

Average UK residential emissions are about 3 tonnes CO2 per **household** per year.

For comparison, flying from London to Sydney emits about 3 tonnes CO2 per **person** per trip.